VOLUME IV JANUARY, 1913 Number 1

THE JOURNAL OF EDUCATIONAL PSYCHOLOGY

PROBLEMS IN THE SCIENTIFIC STUDY OF THE TEACHING OF ARITHMETIC.

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INTRODUCTORY STATEMENT.

An exhaustive treatment of this subject would go far beyond the limits of this paper. It would indicate means of securing full answers to the two questions:

1. *What arithmetic ought to be taught?*
2. *How can this arithmetic be taught best?*

The main part of the present paper will be given to indicating ways of determining the relative values of the more obviously conflicting practices and opinions concerning the present teaching of the subject. An outline will also be given of what an exhaustive study would include. Most classroom teachers and others not interested in the more technical parts of the article will doubtless wish to turn immediately to Part II.

It will be seen that, as stated above, the first of the two questions is fundamental. Doubtless a large majority of the questions most available for scientific study lie in the field of conflicting methods. *How to teach* immediately gives grounds for differences of opinion. Testing hypotheses is one phase of science. It is important that these studies be pushed forward, but it is even more important that the question of *what to teach* be scientifically investigated. Much study has been devoted to this question in recent years, and to its results may be attributed many omissions of obsolete subject-matter.

Further and more accurate studies will doubtless show that still other subject-matter can be safely omitted, and thus the need of investigating the relative values of conflicting methods of teaching certain topics will be eliminated, *e. g.*, if it is shown that fractions whose common denominator cannot be determined by inspection have no place in the subject-matter of arithmetic, there will be no need of a scientific study to determine the degree to which it pays to explain the processes of reducing to a common denominator.

If, then, an investigator wishes to be certain that his study is entirely fundamental, he must either work in the field of the first of the above-stated questions or select such phases of the second question as are certain not to be eliminated by investigations in the field of the first question. Otherwise, he may find that he is 'hitting at a straw man.'

I. What Ought to Be the Subject-Matter of Arithmetic?

Much progress has been made in answering this question by applying the criterion of utility to the various topics of arithmetic. But up to the present time comparatively little thoroughly scientific work has been done in the field.

Then, too, it is rightly felt that ultilitarianism is not the only standard for judging the worth of subject-matter.

Following others, Professor Smith has classified the values of arithmetic as *practical* and *cultural*.[1] There are, then, two phases of the question, viz.: the practical one, *What Arithmetic is needed in order best to make a living?* and the cultural one, *What Arithmetic is needed in order to make the best living?*

The answer to the practical phase is found in the study of the values of the subject as an instrument of economic welfare; and the answer to the cultural phase is found in the study of the values of the subject as an instrument of mental development. The one phase is mainly sociological, the other mainly psychological. The answer to the sociological phase is being found in social ife; the answer to the psychological in mental life. The one is a problem in educational sociology; the other a problem in educational psychology.

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[1] *The Teaching of Elementary Mathematics*, New York, 1900; also *The Teaching of Arithmetic*, New York, 1909, both by David Eugene Smith.

The Practical or Sociological Phase.

An adequate answer to the sociological phase must be based on a full knowledge of the values of arithmetic in the economic and other social needs of life. Its field is largely that of the economic activities; but it also includes all social activities in which arithmetic functions, *e. g.*, games, travel for recreation or culture, etc.

Some of the phases of this question are:

1. *What minimum of arithmetic is needed by all people in the economic activities of life?* This must be taught to all boys and girls.

2. *To what relative degrees are the respective topics in the irreducible minimum used? e. g.,* How much more often is addition needed than division; decimal fractions to thousandths than to millionths, 10 per cent. discount than 6 per cent. interest, etc.?

3. *What is the minimum of arithmetic needed by all people for the play and other recreative activities of life?* This ought to be taught to all boys and girls.

4. *What additional arithmetic is needed in the respective trades and professions?* This inquiry should include the preparatory values as well as the intrinsic values of the subject, *i. e.,* it should show what arithmetic is needed as a preparation for other subjects used in the respective vocations as well as what arithmetic is needed for following these vocations. In this connection the inquiry should answer such questions as, *What arithmetic is needed as a preparation for the algebra that is required by civil engineers?*[2]

Whatever additional arithmetic is found essential to success in the respective trades and professions should be taught to those entering these walks of life.

The 'Cultural' or Psychological Phase.

The adequate treatment of the psychological phase of the question must be based on a full knowledge of the values of arithmetic in the mental aspects of life. This is the question of the *mental discipline* values of the subjects.[3]

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[2]Compare problem 7 under cultural phases of the question.

[3]Certain phases of this problem seem at present impossible of exact solution. Methods and means of attack are lacking. Psychological and statistical research have not yet developed sufficiently to make full investigation possible; but it is none the less important that we face the question.

Some of the problems in this question which need scientific study are:

1. *What disciplinary values has arithmetic that are peculiar to the subject?* The answer to this question will tell whether the subject has distinctively 'cultural' values.

2. *What of the peculiarly disciplinary values of this subject are needed in all walks of life?* These must be attained by all boys and girls of normal ability.

3. *What additional disciplinary values are needed in the respective trades and professions?* These should be attained by those entering these respective walks of life.

4. *What arithmetic help is needed by the developing child to best further the respective stages of his growth? i. e.,* What are the instinctive number needs of the various stages of child development? It may be found that the answer to this question is identical with or included in the answers to the sociological questions; but the importance of adequate provision for development makes it imperative that the matter be studied from the standpoint of *nurture.* We need to know what arithmetical stimulii are needed as mental food as well as what arithmetical abilities are needed to meet the practical and cultural demands.

A case in point is that of the arithmetical aspects of children's play. At present it is probably safe to say that the vast majority of even the best teaching regards the play tendency as a means of teaching certain prescribed arithmetic instead of regarding the arithmetic as a means of promoting the growth of certain desirable play tendencies. It is evident that from the standpoint of education as growth much of even the better teaching is probably open to severe criticism. Thus it is seen that this problem is large, far-reaching, and well worthy of thorough investigation.

5. *At what approximate ages are these stages reached, and what are their manifestations? i. e.,* When are the majority of children by reason of inner growth most ready to benefit by the respective phases of arithmetic?

6. *At what age should those number operations for which there is probably no marked instinctive need be taught? e. g.,* long division is a topic for which few children seem to have

any marked instinctive need, and it is usually placed in the fourth grade. If scientific study shows that there is no marked instinctive need which this topic satisfies at any stage of development, is the fourth grade or some other the best grade in which to teach this topic?

The answers to these last three questions will have large bearing on the arrangement of the course of study. They will give direct help in the distribution of arithmetic subject-matter among the various grades, both as to time allotment and as to the order in which topics are best taught.

7. *To what extent is the discipline of the respective parts of arithmetic transferable?*[4] This question is pertinent from two standpoints, viz.: the transferability of discipline from arithmetic to other subjects,[5] and the transferability of discipline from one topic in arithmetic to another topic in that subject.

II. How Can the Subject-Matter of Arithmetic Be Taught Best?

This is the question of *Methods* in the broad sense of that much-used word. It is the question of *how* as opposed to *what*. Given a certain subject-matter to be taught, the scientific study concerns itself with determining which of two or more procedures or methods is the better or the best. In the broad sense in which the term is used here, it will be found to include such factors as *supervision of teaching* and the *time allotment* for the subject.

The list of questions or phases of the large question of methods as stated below is far from complete. It aims to be suggestive rather than comprehensive. The data for the answers to a great majority of the questions as listed may be found in current practice.

What the Individual Teacher Can Do. Whatever is done in teaching or in the study of teaching depends in the last analysis on the teacher. It is the results of actual teaching that count. It is products rather than plans for products that must be measured. Scientific study is, therefore, in a very

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[5]Compare last part of problem 4 under practical phases of the question.
[4]Much good work has been done on this problem, but more is needed.

fundamental way, dependent on the work of classroom teachers. Fortunately, there are many teachers today who have strong and clear-cut convictions about methods of teaching, and many of these teachers are able to put their ideas into practice.

That equally bright and capable teachers differ fundamentally in their methods merely shows the stage of education as a science. What scientific study must do is to evaluate these various methods.

Individual teachers can do much. The greatest thing for them to do is to get a good method of procedure clearly defined, follow it consistently and then get its results adequately evaluated. This evaluation will ordinarily be best made by a trained investigator; but teachers are rapidly finding that they do not need to wait for a trained investigator. The requisites for evaluation are: data to be evaluated, units of measurement, defined conditions for using these units and standards for comparing results. Fortunately, standardized tests[6] are rapidly becoming available in such form that the class teacher can readily utilize them without special psychological or statistical training.[7]

Ideal Conditions for Scientific Study. The best conditions for scientific study are those in which teachers and special investigators co-operate. The investigator may be superintendent, supervisor, principal or some person from outside the

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[6]The tests of Mr. Courtis are doubtless the best available. They afford means of measuring and interpreting results in the four fundamental operations and in simple reasoning.—S. A. Courtis, Detroit, Mich.

[7]Teachers should also employ standardized tests for another purpose, viz.: that of determining the needs and progress of their pupils. How much does my class need to improve? Compared with what other boys and girls of the same age and grade are doing, how well do mine do? How well do they add, subtract, etc.? These are questions that every teacher wants to answer. Happily she can now get definite answers and compare them with definite standards. Adequate testing at the beginning of a term shows where the class stands as a class, and where the pupils stand as individuals. The teacher then can plan to meet class and individual needs. At about the middle of the year or term the tests should be repeated and progress noted. This will form the best basis for further teaching, and then, at the end of the year, a third testing should be made to measure the year's gains. Then this same teacher may well see to it that these same pupils are tested at the opening of the following year and note vacation losses.

To summarize, then, every teacher, whether she is following a particular or unique method or not, can and should utilize tests to determine needs at the opening of the year or term, to determine progress during the year or term, and to measure losses during vacation.

system, but whoever he is, he must have the co-operation of the class teachers. The class teachers must follow the methods definitely and accurately, and then submit the results to measurement, regardless of their personal opinions; the investigator must measure precisely and adequately, then evaluate the results, regardless of his preconceived beliefs. The larger the number of measurements, the more conclusive the results; hence the desirability of wide co-operation.

Two Main Sources of Data. There are two main sources from which data may be secured for the evaluation of different methods, viz.: measurements of current practices and measurements of specifically controlled practices or procedures. Much teaching is today so clearly committed to definite methods that measuring the results of selected types of current practice would go far toward evaluating such methods. A case in point is that of teaching subtraction by the so-called Austrian or 'making change' method and by the common or 'taking away' method. The staunch advocates of each are at work. Why not measure and evaluate these methods? Another case is that of rationalizing such operations as carrying, borrowing, placing partial products, etc. Rationalizing is being done in varying degrees. Why not select an adequate number of pupils definitely taught each way, measure their abilities and then evaluate the methods?

Many Factors Combine to Determine Abilities. It may be objected that there are many other factors that determine abilities besides that of method, and merely to test pupils that have been taught according to given methods might not prove much about the relative value of these methods, because of the intermingling of the various factors. This contention would be true if there were not enough systems of schools tested so that the variation in the other factors would be equalized. Every investigator should take full account of all the factors contributing to the product measured. The chief factors that determine arithmetical abilities are:

Capability of learners
Efficiency of teachers
Methods of teaching
Supervision
Time allotments
The course of study.

Rarely, if ever, are all the factors, except the one being tested, found operating equally in different systems of schools. Hence the need of testing the pupils in a sufficient number of systems so that differences in the other factors will equalize each other. But even with a very large number of systems tested, this is always an element of doubt; hence the controlled procedure is desirable before final conclusions are reached.

The following sketch of a problem and a method of securing data by a controlled procedure will serve to illustrate the use of this means of getting help in the scientific solution of a problem of teaching.

A Problem and a Suggested Method of Securing Data by a Controlled Procedure: *Oral or Mental vs. Written Arithmetic.* How much of the work should be oral rather than written? How ought the time to be divided between written and non-written work? Obviously the answer to this question will depend on many factors and differ with different topics. At present there is no guide except opinion. Any teacher can make a beginning toward answering the question by systematically carrying out well-laid plans and measuring results.

The question could probably be most readily studied by a single teacher or group of teachers in departmental teaching, though a teacher of one grade can divide her class into two groups, equal as to arithmetical ability, and do much toward answering the question.[8]

In planning for a 'controlled practice' great care should be taken to equalize all factors save the one to be tested. Uniformity should be followed by all teachers in all such matters as amount of home work, individual coaching, the handling of written work, use of incentives, etc.

To state a method of controlled procedure in some detail, the pupils should be divided so that about equal capabilities

[8]Teachers often hesitate to work with pupils under what seems to them extreme conditions, thinking that anything in the nature of a departure is an experiment, and therefore dangerous. This hesitation is not usually justified, for even if results show that some groups have been somewhat at a disadvantage, it can be made up to them very readily after the controlled testing is completed. It will be noted that here, as elsewhere in this discussion, the word *experiment* is not used. This is done because the word has come to suggest something radical, dangerous, and therefore to be avoided.

exist on each side; then an agreement should be entered into and kept as to the apportionments of time for each of the groups concerned. Supposing there be 45 minutes daily recitation, one group might agree to devote 15 minutes per day to oral and 30 minutes to written, another 10 to oral and 35 to written, another 30 to oral and 15 to written work. After all groups have worked a given number of days on a given topic, *e. g.*, simple interest by 6 per cent. method, all three groups should be tested. Let the tests be thoroughly adequate. The problems for the tests might well be drawn from several sources. One set might well be agreed upon by the teachers of the respective groups, another selected by the superintendent or other co-operating investigators, and another might well be drawn from the actual current business practices of the community.

Absolute uniformity as to time allowed for tests, directions to pupils, etc., should be maintained, and to this end it is essential that some one person equally strange or equally well known to all the children give all the tests. Teachers, principals and all others should refrain absolutely from participating in any way.

It is best to have tests and directions printed. For this will minimize such factors as differences of accessibility of blackboard writing, dangers of not being understood in oral statements, etc.

An adequate measuring of results would require tests at several intervals after the teaching. One thorough testing should be made at the close of the teaching of the topic. This would indicate the relative potency of the respective methods in producing immediate results. Another thorough testing should be made after an interval of about a month, and another at perhaps the end of a year. The later testings are needed as a means of comparing the methods for the degree in which they enable pupils to retain the results of teaching.

Typical Problems in Teaching.

As stated above, this list of problems in methods is only partial.[9] For the most part, the suggestive questions have

[9]For certain others and a more extended discussion of some of these, see Smith and Suzzallo, Chapters XIII and XIV, Smith's *Teaching of Arithmetic;* also Courtis in his Folders and various articles.

been grouped under the familiar divisions of arithmetic. To some teachers and investigators the stating of certain of these questions as problems for study will seem like 'setting up straw men.' But the writer believes that all the alternatives exist in practice, and if scientific investigation can help to knock down what ought to be straw men, so much the better for science and investigation.

In Addition.

1. What is the relative difficulty of the combinations?
2. Which is better, to add one number after another or to add by groups? *i. e.,* in adding 1 plus 2, plus 8, plus 9, should children be taught to think 3, 11, 20; or should they be taught to think 2 plus 8 equal 10, 9 plus 1 equal 10, 20?[10]
3. Which is better, to teach the addition combinations above 10 (sums above 10) concretely as the combinations below 10 are taught, or to master all addition and subtraction combinations below 10 and then find the combinations above 10 by taking from one addend enough to add to the other to make 10?[11]
4. Which is better, to add up or down the columns?
5. Does it pay to write down the numbers to carry?

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[10]It must be constantly kept in mind in investigating this question, as in all others herein stated, that conclusions must be reached first of all concerning class or mass teaching. Questions of individual treatment, allowing for individual initiative, etc., are important, and should receive due attention, but research in teaching should concern itself first of all with problems from the standpoint of class presentation. With more specific reference to the above-stated problem in the teaching of addition, there is no doubt that some children will and should add by grouping into tens. No doubt these pupils should be encouraged as individuals, and there is equally no doubt that in business schools other than the one-after-another addition should be taught.

Future mathematicians and future accountants and others with some cleverness in handling numbers there will and ought to be in practically every class; the short cuts that the genius of these pupils prompts them to use ought to be welcomed; but there will and also ought to be many other pupils who have no particular genius for handling numbers—many of the future professional men and women, the future working men and women, and the future housewives.

Hence the question as here stated refers to the best way of *presenting* column addition to the great body of boys and girls, *i. e.,* to its presentation to 'all the children of all the people' in public elementary schools.

[11]See Stone-Millis Primary Arithmetic, pages 21, 22, 23. E. g. $\begin{matrix} 6 \\ +9 \end{matrix} = \begin{matrix} 5 \\ +10 \end{matrix}$

6. Which is better, to teach addition combinations and their reverses in association or separately?[12]

7. Which is the better *check* on errors, adding the same direction again or reversing, *i. e.,* if one has added up, is it better to add up again or add down for the check or so-called proof?

In Subtraction.

1. Which is better, the method variously named Austrian, making change and addition, or the one usually called the taking away method?[13]

2. If the borrowing method is used, which is better, to explain the basis for borrowing or to proceed at once to making the operaton habitual?

3. Does it pay to change the figures in the minuend while pupils are learning the *borrowing* method?

4. Which is the better proof, to add subtrahend and difference or to repeat the subtraction?

In Multiplication.

1. What is the relative difficulty of the multiplication tables and of the individual combinations?

2. Which is the best order in which to teach the tables, and what is the best form in which to write them?

3. To what extent should the reasons for the correct placing of the partial products be explained?

4. Which is the better check on multiplication, casting out nines or dividing the product by one of the factors?

5. How valuable are such explanatory algorisms as those illustrated by Professor Smith in his *Teaching of Arithmetic,* page 94?

In Division.

1. Which is better, to teach the division tables as new tables or to employ the so-called Austrian or multiplication method?

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[12]For extended discussion, see Smith and Suzzallo in the *Teaching of Arithmetic,* pages 58-60.

[13]Conclusions as to this problem must, of course, include the effect which work by the addition method would have on addition ability.

2. To what extent should the teacher attempt to rationalize the processes of division through explanation?[14]

3. To what extent are such explanatory or 'accessory algorisms' as those given by Professor Smith on page 95 of his *Teaching of Arithmetic* of value?

4. How essential is it that the so-called partition 'case' of division receive special attention?

5. Which is the better proof of division, multiplying the quotient by the divisor or casting out nines?

In Fractions.

1. Which is better, to teach common fractions or decimal fractions first?

2. What are the objections to handling all fractional parts except halves, fourths, thirds and sixths in decimal form?

(a) What, if any, schoolroom needs would not be adequately met?

(b) What, if any, out-of-school needs would not be adequately met?

3. What is the value of rationalizing processes? *e. g.,* How valuable is it to get pupils to understand multiplying by a fraction or inverting the terms of the divisor in dividing by a fraction?

4. As a means of temporary help, does it pay to rewrite numbers in subtracting fractions?

In Denominate Numbers.

1. How much first-hand experience in using the units of measurement is essential?

2. Which is better, to teach square measure by *developing* concepts of the various units,—square inch, square foot,

[14]In this, as in all questions that have a formal alternative, the final conclusions as to value must take account of the full effect of the more formal procedure. In the final answer to this question it may very well be found that even though the division *per se* were done as well or better by the more formal method, the more rational method would still be of greater value, because of the injurious effects caused by the more dictatorial, *instilling* method of presentation. As is evident, such questions may become problems of the psychology of habituation and memorizing before they are finally answered. This is a very difficult field of experimentation, but of great importance. At present we have only conjectures as guides. We need conclusions based on scientific studies.

5. In division of decimals, is it better to make the division integral by removing the decimal point equally in divisor and dividend or to locate the decimal point in the quotient by rule? square yard, etc.,—or to proceed immediately to the formula, *the number of units in the length multiplied by the number of units in the breadth gives the area?*

3. The same information is needed regarding the teaching of cubic measure.

In Percentage.

1. What is the best approach to percentage, through common or through decimal fractions, or through both?

2. What is the place of formulae? Should they be introduced at once or as soon as enough analysis work has been done to enable the majority of pupils to see the reasonableness and the more capable ones to grasp the significance of the procedure, or not at all?[15]

3. Is the use of x and the *algebraic* method best?

4. What is the value of working by the so-called *cases* of percentage?

In Interest.

1. Which of the various methods of reckoning interest is best, the so-called common method, the 6 per cent. method, the 12 per cent. method, the method by aliquot parts or the cancellation method?

2. To what extent should more than one method be taught in the elementary school?

3. What is the place of interest tables in teaching the subject?

In Reasoning.

1. How many of the various types of reasoning must be specifically taught in order to insure capability in handling all types?[16]

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[15]It is evident that the answer to this question, in common with many others, must include both a psychological and a sociological consideration. For if the mental effect of a given procedure is not objectionable, the social need may rightly decide the question of its being chosen. Compare questions 1 and 3 under *The Practical or Sociological Phase* of the first question above.

[16]See Suzzallo, *Reasoning in Primary Arithmetic.* California Education, June, 1906. Here Professor Suzzallo suggests the following order for the 20 types: 1 (+), 2 (−), 3 (++), 4 (−−), 5 (+−), 6 (−+), 7 (×), 8 (÷), 9 (××), 10 (÷÷), 11 (×÷), 12 (÷×), 13 (+×), 14 (×+), 15 (−×), 16 (×−), 17 (+÷), 18 (÷+), 19 (−÷), 20 (÷−).

2. How potent is the language difficulty in the reasoning work of arithmetic?[17]

3. In the light of the language difficulty, what ages are best for teaching the various types of reasoning?

4. What is the effect on reasoning ability of omitting all systematic arithmetic work from the first one or two grades?

5. What is the effect on reasoning ability of teaching the formal operations to the exclusion of reasoning work? *i. e.*, Is the work in the so-called fundamental operations really fundamental to reasoning or must the operation be taught in situations demanding the respective operation in order to insure ability in knowing *when* as well as *how* to perform a given operation?[18]

6. What is the effect of using the so-called *real* or vital problems as opposed to 'bookish' ones?

7. How full should analysis be?

8. How much labeling should be required?

(a) At what stages in learning is it essential?

(b) When and to what extent should it be abandoned?

9. How important are so-called accuracies of statement? *c. g.*, in stating the process of determining the cost of 15 pencils at 5 cents each, how essential is it that the child state his operation 15 times 5 cents rather than 5 times 15?

10. How large a portion of arithmetic time ought to be devoted to the reasoning part of arithmetic? *i. e.*, What is the right apportionment of time between concrete and abstract problems?

11. How far ought combinations, tables, rules, etc., to be rationalized?

Vacation Losses.

1. What is the effect of vacation on respective abilities in arithmetic?

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[17]Suzzallo, Opposite citation.

[18]It is evident that even if the direct help, to reasoning, of previous isolated teaching of the operations is practically *nil*, there is still the question whether it is not economical to have already acquired ability in the formal work when reasoning is demanded by concrete situations. Even if it be shown that reasoning can be more economically taught after formal ablity has already been acquired, it is still a question whether learning the mechanical operation without the motive of a felt need is desirable for the pupil.

2. How can vacation losses best be counteracted?

3. What is the relation of large amounts of drill to vacation losses? *e. g.,* of extended reviews and drills for final examinations?

4. What is the value of vital problems as a means of counteracting vacation losses? *i. e.,* if arithmetic is so taught that it stands for the quantitative aspects of the pupil's interests, does the pupil's unconscious and conscious use of the subject through vacation appreciably help in counteracting vacation losses?

Utilizing the Play Tendency.

This topic has been previously considered in this article from the standpoint of the practical values of the subject—question three; and from the standpoint of the 'Cultural' values of the subject—question four. The following questions are stated from the standpoint of the teaching of arithmetic *per se.* The large question here is *How much better, if any, do children learn arithmetic when their play tendencies are utilized?* Some of the specific problems are:

1. How much of arithmetic can be taught incidentally and informally by a wise provision of well-selected games for home and school recreations?[19]

2. What is the effect of adapting such games as dominoes to class use as a means of teaching the recognition of number symbols? In dominoes, for example, the dots are placed on large cards, and after the game is learned it is so conducted as to appeal to friendly rivalry and emulation as well as to the primal instincts of physical and mental activity.

3. What effect does the utilization of counting involved in selecting the number of pupils needed in such play games as *Soldier Boys* have on teaching to count by *ones, twos* and *threes?*[20]

4. What are the effects of utilizing the motive of score-

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[19]This question is particularly applicable to the arithmetic work of the lower grades. Much apparently good work is being done in several schools and in a few recent textbooks. But no scientific study of its values has been made.

[20]In such situations as this, the arithmetic used is not germane to play itself, but comes in rather as a means of furthering preparations for play. It may be termed a by-product. Many teachers are utilizing it to apparent advantage. Its exact value ought to be known.

keeping and score-computing in teaching addition, multiplication, etc.?

5. Under what stimulus do children learn to subtract the more readily and effectively, that of making change for the purpose of purchasing articles in a play store or that of following the directions of the teacher for the purpose of taking away a given number from another given number?

6. What effect do organizing and conducting a play bank have on the teaching of the use of pass books, deposit slips, checks, bank discount, stocks, etc.?

Such 'dramatizations' of life situations are common in the more progressive schools. Their value ought to be more definitely known.

The Distribution of Arithmetic Among the Grades.

1. Are pupils more efficient at the end of the elementary school course if they begin arithmetic in the first school year than if they begin it later? What are the effects of omitting the subject from the first grade? From the first and second grades?

2. What is the effect of omitting arithmetic for a term or a year from one or more of the intermediate or grammar grades?

3. To what extent is a spiral treatment of the topics of arithmetic desirable?

Among the questions not covered by this article is *the importance of the effect of work on arithmetical abilities.* It is commonly believed that engaging in certain kinds of work promote these abilities in a marked degree. This belief should be tested. Other topics that have been partially covered, but which merit definite treatment, are: *The time cost of arithmetic, motivation vs. drill, textbook vs. community problems and the efficacy of supervision of the teaching of arithmetic.*

MENTAL ADAPTATION DURING THE SCHOOL DAY AS MEASURED BY ARITHMETICAL REASONING.—PART I.

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GENERAL SUMMARY.

In the best current pedagogy considerable attention has been given to the results of pedagogical investigations on mental fatigue in school children, but little attention has been given to the cognate phenomena of mental adaptation. The belief is current that the earliest hours of the school day are the most suitable for severe mental work of a rational kind. An attempt is made to show whether this belief is well grounded or not. Whole classes, working always under one teacher, have been divided each into two equal groups on the basis of several tests in problematic arithmetic. Then, subsequently, one of the two equal groups has continued to work similar tests early in the morning session, and the other has worked the same tests later in the morning session. The work has been done with children of various social classes, of various ages and of various grades of mental ability as measured by school standards. In all cases, except one, the group of children who work later have done better work than those who work earlier. The difference in improvement appears to be about 5 or 6 per cent. In one case, that of a school in a very poor neighborhood, the earlier working group improves more rapidly than the one working later. About half the boys in this class "go to work" very early in the morning before commencing school, and nearly all of them do some work before school begins. It is suggested that their general mental adaptation is at its height earlier in the morning than that of children in other schools. The conclusions generally are in direct contradiction to current pedagogical practice in England. If well grounded, a considerable change in

school time-tables seems desirable. Severe mental work of a rational kind, except in the very poor schools where the boys rise early and "go to work" before school, should be placed later in the school session than it is at present.

I. The Problem Stated.

The experiments about to be described were undertaken as a companion piece of work to that on "Mental Fatigue During the School Day," published in the *British Journal of Psychology* for December, 1911. Educationists, when considering pedagogical practices, have shown themselves not unwilling to take into consideration the results of experimental work on mental fatigue, but it can scarcely be said that much attention has been paid to the cognate phenomena of mental adaptation.

Yet it is obvious, on a moment's consideration, that the one is as important as the other. For if a knowledge of the conditions of mental fatigue enlightens the educationist as to the "worst times" for certain functions, so a knowledge of the conditions of mental adaptation enlightens him as to the "best times."

It is generally accepted in elementary schools throughout the civilized world that the rational parts of problematic arithmetic present more difficulty to children than any other subject taught in these schools. In England, therefore, educationists have argued that we must teach this subject as early in the morning sessions as we can. For historical reasons, "Scripture" (almost invariably) occupies the first school period, namely, from about 9 to 9.40 A. M., a few minutes after 9 being allowed for registration. In a report on the *Teaching of Mathematics in Elementary Schools,* recently published by the English Board of Education, Mr. P. Ballard points out that it is the almost invariable practice to take the arithmetic lesson in the school period which commences about 9.40 A. M., immediately following Scripture lessons.

Having regard to the nature of general mental adaptation, it seemed to me that the English practice might be based upon a misconception as to the best time in the morning for arithmetical reasoning. The following investigation was undertaken to supply some evidence bearing on the question.

II. First Series of Experiments.

1. *General Plan.*

A first series of experiments was carried out in a London municipal boys' school situated in a very good suburban neighborhood. The boys averaged 9 years 2 months in age and were graded as Standard III. The whole class, about 40 in number, was divided into two equal groups on the results of a number of tests in problematic arithmetic. Then, subsequently, one of the groups continued the work *early* in the morning sessions, and the other group *late* in the morning sessions of the same day. Comparisons are instituted to show which time appears the more favorable to work of this kind. All the tests were administered by the teacher of the class—an able man with some experience of research work in biology, but somewhat new to psychological investigation.

2. *The Tests and the Method of Marking.*

The sets of tests used were all constructed on the same plan. The questions were cyclostyled, and each boy on each occasion was provided with a separate question paper. One such set follows:

1. One pole is 35 feet long and another is 17 feet long. How long would they reach if put end to end? (One step.)
2. Mary has 3s. 4d. and Alice has 2s. 7d. more than Mary. How much have they together? (Two steps.)
3. Jack has 46 marbles and Tom has 38 marbles. How many must Jack give Tom so that they have equal shares? (Two steps.)
4. One boy earns 1s. 6½d. a week and another earns twice as much. What do they earn together in a week? (Two steps.)
5. Mother shared some nuts equally among five children. Each child got 36 and there were seven left over. How many nuts did mother have at first? (Two steps.)
6. A man bought a motor car for £200. He kept it for four weeks and it cost him £3 a week for a man to look after it. He sold it afterwards for £220. How much did he gain? (Three steps.)

All the other sets of tests were like the above, except that the subject-matter of the problems and the figures were changed. But in this school the *order* of the problems, set by set, was *not* changed; that is, problem 1 in the first set retained its place as problem 1 in the second set, and so on. The children were asked to solve the problems numerically. This

process was, of course, a regular school exercise, and it was not necessary, as it often is in the case of new exercises, to give a number of preparatory tests before the children begin to settle down into their proper places. But even in this case the results of the *first* test were discarded. In marking the work no attention was paid to the correctness or incorrectness of the numerical solution, but the sums were looked through to see how they had been worked from a problematic standpoint. As teachers would say, "Was the problem done the right way?" We marked to answer that question, allowing one mark for every rational "step" which was on the way to a correct solution, even though no solution was actually arrived at. It will be seen that the figures were so chosen that mechanical difficulties of computation were avoided. The maximum mark obtainable for each set of problems was 12.

3. *Chronology of the Experiment.*

The first test took place on Friday, July 23, 1911, at 10.15 to 10.40 A. M., a few days before the summer vacation. Neither the teacher of the class, the head master of the school, who was relatively new, nor myself were quite sure that the tests were of the right pitch of difficulty; so this preparatory test served a double purpose: it enabled the boys to get practice in working the tests precisely in the form required, and gave us an opportunity of analyzing the results to see how far the tests were suitable.

Forty boys did this preparatory test, and we found that

2	boys	obtained	12	marks.
4	"	"	11	"
3	"	"	10	"
5	"	"	9	"
2	"	"	8	"
9	"	"	7	"
5	"	"	6	"
5	"	"	5	"
3	"	"	4	"
2	"	"	1	"

Every boy was able to do something; two received full marks, and the bulk of the class received from 5 to 9 marks. The marks actually obtained amounted to 60.6 per cent. of the possible marks. It would interest teachers to know that the

40 boys scored 34 marks for the first problem, 58 for the second, 43 for the third, 48 for the fourth, 65 for the fifth, and 43 for the sixth. It is, perhaps, important to note that in this experiment exactly 25 minutes were allowed for working the problems, and it was intended to retain a rigid time limit throughout.

After the summer holidays were over, and the children had had a couple of weeks in school to become generally adapted to mental work, the preliminary tests were begun. They were given on Monday, Tuesday, Wednesday, Thursday and Friday of the week ending Saturday, September 9, from 10.15 to 10.40 A. M. The lessons preceding were Scripture every day from 9.10 to 9.40; then from 9.40 to 10.15 on Monday, Wednesday and Friday the lesson was Word-building; on Tuesday it was Reading, and on Thursday the Repetition of Poetry already partially known. It will be seen that there was nothing in these lessons likely to affect prejudicially the results in arithmetical reasoning. No arithmetical lessons of any kind other than the tests were given during the week. The children were not told day by day what marks they had obtained, but at the end of the week, which they had been told to await, they *were* informed, though, of course, no errors were pointed out, nor did they know their marks for particular problems.

The next week's lessons, arithmetical and other, proceeded just as usual, and a division of the class into two equal groups was made on the results of the five preliminary tests which had been done the week before.

The week after, the final tests began. They were given on Monday, Tuesday, Wednesday, Thursday and Friday of the week ending Saturday, September 23. One of the two equal groups—Group A—worked their problems from 9.40 to 10.5 A. M., whilst the other group—Group B—wrote an English composition exercise. They were required to construct a story containing certain words, or to write an imaginary account of how a situation, indicated in a picture given to them, arose. Both groups worked all the time in the same room under the same teacher. Then from 10.5 to 10.35 both groups had the same lessons, which differed on the different days of

the week, but were in all cases oral lessons. At 10.35 the boys went into the playground, returning at 10.50. There were then two short lessons from 10.50 to 11.10 and from 11.10 to 11.25; they comprised Physical Exercises, Dictation, Object Lessons, Spelling and Penmanship. It is better for experimental purposes to have the same lessons day by day, but it is also good at times, for practical purposes, to take the school time-table exactly as one finds it. At 11.25 the boys in Group B worked the same test problems previously worked earlier in the morning by Group A, whilst Group A worked the corresponding exercises in English Composition. At 11.50 all work was stopped. The results of their work on the test problems and the composition exercises were made known to the boys at the end of each week, but not before. We now had the results of five preliminary tests given to the whole class at 10.15 A. M., and those of five final tests given to one group at 9.40 A. M., and to the other group at 11.25 A. M. If the daily habituation, produced by working a particular kind of exercise at a particular time, is a factor in the result, and I should hesitate to deny it, it would operate on the whole in favor of the group working at 9.40, for the five lessons in arithmetic given to the class weekly are taken at 9.40 A. M. on Mondays, Wednesdays and Fridays; at 11.15 A. M. on Tuesdays, and at 2 P. M. on Thursdays. This is an unusually irregular placing of arithmetical lessons for Standard III, but still the balance of habituation is, as usual, in favor of the school period commencing about 9.40 A. M.

4. *Results.*

The preparatory test given before the summer holidays was worked by 40 boys. A few additional boys were placed in the class after the vacation, so that 44 boys were available for division into two equal groups. One boy, H. B., in Group B, was away during the week of the final tests; the corresponding boy, A. W., in Group A, was, therefore, omitted. The correlation coefficients between the successive tests in the preliminary tests were, between 1 and 2, + .69; between 2 and 3, + .77; between 3 and 4, + .94, and between 4 and 5, + .87. In the final tests the correlation coefficients were, between 1 and

2, + .90; between 2 and 3, + .83; between 3 and 4, + .87, and between 4 and 5, + .90. The correlation between the totals of the Group A series and the totals of the Group B series were in the preliminary test + .99, and in the final tests + .89.

I will give first the comparative results in gross. Group A averaged 9 years 2 months in age, whilst Group B averaged 9 years 1½ months. Group A scored an average mark per boy per test of 7.9 (mean variation 1.7) in the preliminary tests and 8.4 (mean variation 1.9) in the final tests. The corresponding marks for Group B—the group which worked the final tests later in the school session—were 7.9 (mean variation 1.7) in the preliminary tests and 8.8 (mean variation 1.8) in the final tests. Group A improved 6.3 per cent. on its preliminary record; Group B improved 11.4 per cent. There is, therefore, a balance in favor of the later working group of about 5 per cent.

I will next show the comparative results, test by test:

Table I, showing the results of Group A and Group B compared, test by test, in the preliminary and final tests.

		Preliminary Tests.					Final Tests.				
		1st.	2d.	3d.	4th.	5th.	1st.	2d.	3d.	4th.	5th.
Group A.	Av. mk.....	6.6	7.9	8.1	8.3	8.5	8.5	8.4	8.1	8.5	8.6
	M. V.....	1.8	1.8	1.8	1.8	2.0	1.8	1.9	2.1	2.3	1.7
Group B.	Av. mk.....	6.6	7.6	8.2	8.6	8.4	8.2	8.2	9.1	9.1	9.2
	M. V.....	1.6	2.0	2.1	2.0	2.3	1.7	1.8	1.9	2.0	2.2

It will be noticed that Group B does not start off so well as Group A in the final tests, though before the week is out it has forged well ahead. The sudden leap of Group B from an average of 8.2 on Tuesday to 9.1 on Wednesday is very unusual for boys at this stage of practice, and makes one suspect some extraneous factor, but diligent investigation failed to show any, for we had decided, in arranging this experiment, to risk the possibility that some members of the earlier working group might communicate with some members of the later working group during the recreation interval and tell them what problems they had worked and how to solve them. The alternatives were (1) to retain one of the groups in the schoolroom during the play interval; (2) to keep the two groups separate in the playground whilst play was going on. Neither of these courses was adopted, for they would both of them

have vitiated the result. We wished to know what would happen *under the usual conditions of school life* both as to work and play; moreover, to take obvious steps to prevent boys from communicating is to make them suspect at once that there is something special going on, and that is precisely what we endeavored to avoid. To treat the whole thing as part of the usual school routine—to display no special interest or anxiety about it—was the best way to avoid an unintelligent co-operation on the part of pupils to produce unusual results—a co-operation which might have been useful pedagogically, but would have been misleading psychologically.

Moreover, communication from boys of Group A to boys of Group B certainly did not occur in any general way. The boys were unostentatiously watched, and were at play in playtime, as boys usually are; they were not seen standing in corners, anxiously listening to arithmetical "tips" from one another. And, further, if boys received "tips," and profited by them, they would "jump up" above boys who, previously higher in the lists, had remained "tipless." But if the boys had changed places much from exercise to exercise, the coefficients of correlation between the successive exercises of the final tests would not have been .9, .8, .9, .9.

Finally, I will give the comparative results of the two groups, section by section, so as to indicate how far the superiority of Group B over Group A is common to the more as well as to the less proficient pupils:

Table II, showing the work of Group A and Group B compared, section by section, in the preliminary and final tests.

	Group A.			Group B.		
Marks for 5 preliminary tests. Max. 60.	No. of boys.	Av. mk. per child per test in 5 prel'y tests.	Av. mk. per child per test in 5 final tests.	No. of boys.	Av. mk. per child per test in 5 prel'y tests.	Av. mk. per child per test in 5 final tests.
Over 50.....	3	11.3	11.7	3	11.3	11.5
40 to 50.....	7	8.9	9.7	7	8.9	10.2
30 to 40.....	8	7.1	7.6	8	7.0	7.7
Under 30.....	3	4.1	4.3	3	4.3	5.5

It will be seen that in the case of the very proficient boys at the top of each group the early morning workers do better than those who work later in the morning, but in all other

cases the advantage is with the sections working later. The weakest section in Group B shows a greater superiority over the corresponding section of Group A than might reasonably be expected. It contains W. G., the bottom boy in Group B, who improves from an average of 1.4 in the preliminary tests to 4.0 in the final tests, whilst H. W., the corresponding boy at the bottom of Group A, improves from 1.4 to 1.6 only. W. G.'s improvement must certainly be looked upon with suspicion at this stage of practice; it is probably not due to practice alone.

III. Second Series of Experiments.

1. *General Plan.*

A second series of experiments was carried out in a girls' school situated in a fairly good neighborhood in the southwest of London. As before, a whole class was divided into two equal groups on the results of a number of preliminary tests in problematic arithmetic. Then, subsequently, one of the groups continued the work early in the morning sessions and the other group late in the morning sessions of the same days. A comparison between the work of the two groups is instituted to indicate which time is the more favorable for work of this kind. The children were of an average age of 12 years 11 months, and were graded in Standards VI and VII. All the tests were administered by the head mistress, who had had much experience of experimental work with children.

2. *The Tests and the Method of Marking.*

The sets of tests used were all constructed on the same plan. One such set follows:

1. Three men earn 27 shillings a day. If 7 men earn as much as 10 women, how much would 23 women earn in a day? (Four steps.)
2. On market day a farmer's wife sold 36 pairs of chickens at 4s. 3d. a pair. To how much did her sales amount? (One step.)
3. A large box took 5 feet 7 inches of wood to make; a small box took 3 feet 9 inches of wood. Out of a number of planks a man could make 100 large boxes. About how many small boxes could he have made? (Three steps.)
4. A man divided 840 acres into three portions. The first was four times as large as the second and the second was four times as large as the third. How many acres were there in the third portion? (Four steps.)
5. Two cyclists set out to ride 70 miles. The first rode at the rate of 9 miles an hour and the second rode at the rate of 11 miles an hour. How long a time did one man arrive before the other? (Three steps.)

6. A girl had 9 sums to do every day for 19 days. She only did 114 sums altogether. If she left out the same number of sums each day, how many did she leave out each time? (Two steps.)

7. A shopman had 93 pounds of bacon to sell. The bacon had cost him £4 12s. 6d. If he sold it for £5 0s. 3d., what profit did he make on each pound? (Two steps.)

8. A man mixed 7 pounds of coffee at 1s. 10d. a pound with 3 pounds of chickory at 10d. a pound. At what price did he sell the mixture per pound if he neither gained nor lost money on the sale? (Four steps.)

The numbers used and the wording of the problems varied from set to set, but the principle of each problem remained the same. The *order* of the problems was also varied from set to set. The maximum mark for the rational steps in the solution of each set of problems was 23. The children were not required to solve the problems numerically, but to state in writing exactly how they would do so. One mark was allowed for every rational step correctly indicated.

3. *Chronology of the Experiment.*

The great difficulty in all experiments of this kind is to secure steadiness in the results. Especially is this difficulty experienced in the case of new exercises. Though these children had, of course, often solved arithmetical problems, they had not been accustomed simply to write down *how they would solve them.* So, after a lesson had been given to indicate exactly what they were to do, three sets of problems of the kind given above were administered under test conditions at 10.45 A. M. on Friday, September 1; Wednesday, September 6, and Thursday, September 7. The papers were examined carefully, and it was found that "steadiness" had hardly yet been satisfactorily achieved. So at 10.45 A. M. on Friday, September 8; Tuesday, September 12, and Wednesday, September 13, three further sets of tests were given, which will be subsequently referred to as the preliminary tests. The lessons preceding the tests were Scripture, and an oral lesson in English Composition, History or Geography. Then also preceding the tests, from 10.30 to 10.45, came the morning interval for recreation.

On the results of the three preliminary tests the class was divided into two equal groups. Then about a week later the final tests were given. Group A worked them at 9.40, imme-

diately after a Scripture lesson, whilst Group B, in another room, studied some English History during a part of the lesson, and then answered questions on paper on what they had been studying. After the recreation interval a lesson in English, which included paraphrasing and the construction of sentences containing certain selected words, was given to both groups. At 11.15 A. M. the class was again divided. Group B worked the problems previously worked by Group A, whilst Group A studied and answered the questions in history previously done by Group B. The final tests took place on Friday, September 22; Tuesday, September 26, and Wednesday, September 27. Before each test, both in arithmetic and history, the girls were told what marks they had gained in the last exercise, but no reference was made in either case to general or individual errors.

4. *Results.*

First, it is important to notice the degree of regularity in the work of the children as shown from test to test. Jumpy results in the preliminary tests imply that a division into "equal groups" will be very difficult to effect, and, indeed, may scarcely be reliable even when it is effected. The coefficient of correlation between the results of the first and second preliminary tests, where "r," the coefficient of correlation, $= \frac{\Sigma xy}{n\sigma_1\sigma_2}$, amounted to + .752, and between the second and third preliminary tests amounted to + .852. With 44 cases and coefficients of this size, the probable errors are very small. The coefficient of correlation between the results of the first and second of the final tests was + .856, and between the second and third + .872.

The total marks of the A series correlated with the total marks of the B series to the extent of + .99 in the preliminary tests and to the extent of + .78 in the final tests, with coefficients calculated in both cases on the moment-product method from the individual results.

I will next give the comparative results in gross. Group A obtained in the preliminary tests an average mark of 15.6 (mean variation 2.7), whilst Group B also obtained an average

of 15.6 (mean variation 2.7). In the final tests Group A obtained 15.9 (mean variation 3.0) and Group B 16.8 (mean variation 3.3). Group A improved on its preliminary record to the extent of 2 per cent., whilst Group B improved on its preliminary record to the extent of 7.7 per cent., which gives about 5 or 6 per cent. as an increase which may be due to mental adaptation.

I will next show the comparative results, test by test:

Table III, showing the results of Group A and Group B compared, test by test, in the preliminary and final tests.

		Preliminary Tests.			Final Tests.		
		1st.	2d.	3d.	1st.	2d.	3d.
Group A.	Av.....	14.8	16.0	16.0	15.0	16.0	16.7
	M. V.....	3.1	3.0	2.8	3.5	2.8	3.5
Group B.	Av.....	14.9	15.8	16.0	16.0	17.0	17.4
	M. V.....	2.8	3.2	2.8	3.7	3.2	3.6

Finally, I will show the comparative results of the two groups in such a way as to indicate how far the superiority of Group B over Group A is common to the weaker as well as to the abler pupils:

Table IV, showing the work of Group A and Group B compared, section by section, in the preliminary and final tests.

	Group A.			Group B.		
Marks for 3 preliminary tests. Max. 69.	No. of girls.	Av. mk. per child per test in 3 prel'y tests.	Av. mk. per child per test in 3 final tests.	No. of girls.	Av. mk. per child per test in 3 prel'y tests.	Av. mk. per child per test in 3 final tests.
Over 55.....	5	20.5	20.3	5	20.3	22.2
45 to 55.....	7	16.2	16.6	7	16.3	17.3
35 to 45.....	7	13.9	14.3	7	13.9	14.8
25 to 35.....	3	9.9	10.6	3	10.1	11.1

Rather unexpectedly, the highest section of Group A shows a slight loss from the preliminary to the final tests, whilst the corresponding section of Group B shows, unexpectedly, a large increase. I do not regard the whole of the difference between the work of these two sections in the final tests as being due to the difference in the time at which they were worked, though some of it is doubtless due to that factor. The differences between the other corresponding sections of the two groups are such as one would expect to find if a small but steadily acting cause were influencing the results in the same direction.

(Concluded in the February number.)

THE CHILD'S SPEECH.

IV. Word and Meaning.

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1. The beginning of speech is the most momentous event in the history of the child. Its understanding is a key to the whole storehouse of knowledge, and upon its use all human fellowship depends. As the means of social intercourse, the repository of learning and the general instrument of intelligence, the invention of language constitutes the greatest single achievement of human evolution.

In individual development the significance of this invention is concentrated manyfold. What the slow course of human progress accomplished for the race in long ages is achieved for the child in a few short years by the possession of speech and writing. Through the former he becomes articulate and rational, through the latter informed and cultured. On the shoulders of his race the child is thus lifted to the apex of humanity, with a penetrating intellectual vision and a universal standpoint. In its objective aspect the level from which he was lifted is immeasurably lower than that of the primitive savage. The child at birth is dumb and irrational; his spirit lies dispersed among unco-ordinated impulses and stimuli; self and world are equally chaotic. Yet even in the confusion of this primitive status the two conditions of the child's ultimate development are discernible—his own organizing spirit which at the very dawn of life is struggling to its feet and the world of organized culture which awaits its grasp.

To this active synthesis every element of experience is vital; the impression is fixed through its associations, the reaction made significant by its consequences. But intuitive experience is hampered by its own unanalysed richness. Both the materials to be drawn upon and the ideal system to be con-

structed from them meet early limitation. A more adequate instrument of reflection is needed than dumb intelligence provides, and the substitution of a permanent record for the dissolving features of individual experience must take place if the human mind is to attack its problems successfully. Language supplies both these deficiencies. It is not only the medium of communication, but also an indispensable instrument of the mind in its intellectual procedure; the sword of Siegfried, by which all obstacles are hewn asunder and a path cleared to the goal of knowledge.

2. The function of language in individual reflection is revealed by any study of the service which names perform. In the first place, the name is both a means of fixing the attention of the child upon an object and arouses traces of previous perceptions, thereby prompting apperception; in the second, it is a means by which the child subsequently renews his own attention, and thus becomes an instrument for clarifying and directing his thought; and, lastly, it is a means by which the attention of others may be called to an object and a specific apperceptive disposition aroused. It thus becomes an instrument both for the formulation of his own meaning and for the guidance of another's thought.

3. Language has a formal and a material basis. Its formal condition is the existence of a content of meaning and intelligence to understand and use signs. Language is the employment of symbols to express thought. Its material basis is the existence of verbal signs which have been invented as names of objects. A language is the system of such symbols used in common by a people to express their thought. The possession of a system of common signs implies a communal life on the part of those sharing it, for to have the same sign and to use it for identical purposes necessitates a common history and process of acquisition.

It is the lack of this community of experience which makes the mastery of a new tongue difficult. The meaning of the symbols of speech is never originally given through definition, but through their significant association with the experiences of life. One need not define the words of his mother tongue; such a procedure is both superfluous and inadequate. It is

superfluous because the meaning must be known before it can be defined, and it is inadequate because the complete content can never be translated into words. Since the foreigner must thus depend upon definition in terms of his own tongue, he fails to enter completely into the genius of a new language.

Between the acquisition of language by the race and its development in the individual there is, of course, the fundamental difference that in the race it meant the invention and development of the system of signs itself, while for the individual it is only the understanding and acceptance of a body of symbols already formulated and in common use by his fellows. He is not free to choose his own signs; at the same time he is not called upon to invent them. He must set himself to learn a great and complex system of symbols; nevertheless his task is largely simplified by the fact that everyone about him uses the same name for a given thing, which secures the incessant recurrence of the symbol in association with its object. The specific problem in the acquisition of speech is to establish this precise association between each word and its meaning or intellectual object. In learning the mother tongue it is to do this in the absence of all verbal means of indicating the object or explaining its nature.

4. The earliest connection between word and thing is not that of a name with the object it denominates. It involves simply the association of the two contents of experience with one another. When the object has been seen or handled—in the wider sense when the situation has been presented—the name has been heard. The recurrence of these two facts in a concrete complex is the basis of their association in thought. The repetition of this experience links the two elements—name and thing—in such a way that when the name is heard the child tends to look for the object or to represent it in mind. The word is not yet a name. At some stage in the process the word becomes a means of indicating the object (a demonstrative term) and of representing it (a connotative term); when the thing is seen or imagined the child now tends to speak its name or to raise it in mind. Earlier in the process of development, however, the word only causes the child to look for the object or raises the idea of it in his mind, as the

sight of one of two familiarly associated things will carry the mind on to the thought of the second without in any way becoming a name for the latter.

5. In many ways the association of a name with the object is found useful, for the sensible world is not broken up into separate objects in such a way that the ready-made individual isolates and rivets the attention of the child; on the contrary, he must resolve the perceptual field, as it is presented at any moment, into its constituents by a process which is slow and difficult. In its course the child is ready to grasp at anything which will help in fixing his wavering attention and in marking out the particular thing from the continuum of perception in which it appears. Among such means the word or name is chief. To utter the name helps to recover the results of former syntheses of perception and affords a basis for a more definite and stable apprehension of the object then presented. Naming, in thus fixing attention, helps to clarify the object of perception.

The name serves also to fix attention upon things which are absent. Its association with the object becomes more significant than any particular quality or function of it in proportion as the synthetic apprehension of the object increases in richness. The word does not carry the mind to any individual and limited aspect of the thing, but to that common reality with which all such special qualities and functions are connected or in which they inhere. It comes, in other words, to be a name for the thing. Thus representing the object as a whole, the name becomes its most general and revivable associate. To recall its name is now the most ready mode of reviving the memory of the thing for which it stands. Names thus become the chief means by which we represent things and think about them.

Speech is mastered when this association between words and ideas has been thoroughly established in the individual mind. It is understood when the succession of words one hears arouses in an unhesitating and effortless way the system of ideas which they are designed to express. The use of speech has been mastered when the rise of any system of ideas in the mind is capable of originating in the same direct and secure

way an appropriate series of representative words. The child early attains this status. By the close of the third year he is both intelligent and voluble. The body of homely speech is familiar to him, and he is fluent in its use.

6. Though the development of speech goes on rapidly, the process of acquisition is inwardly complex and subject to many disturbances. At the beginning is given only the utterance of a sound as the accompaniment of a concrete situation. This situation is indefinitely complicated and the sound is, *a priori,* associable with any part or aspect of it. All specific connections have to be established by actual trial and error. The earliest word must therefore be thought of in its temporal relations only; it is connected with experience at a particular moment in its course, but is connected with the content of that moment in its entirety.

As a matter of fact the situation carries more or less definite indications of the association group into which the word is to enter. Within the total field which is presented to consciousness at any moment the child's attention is at work, selecting and emphasizing, so that the word which in general can only be said to accompany that moment of experience as a whole is actually associated with the particular aspect or portion of the field upon which consciousness is focussed. Moreover, the word is commonly accompanied by an act whose meaning is already, in general terms, understood—smiling, frowning, pointing, holding, using, etc. It is the presence of such acts which chiefly directs attention to a particular part of the field and provides a starting point for the development of that content of meaning which the sound is thereafter to receive. But the existence of this enlightening system of looks, gestures and acts depends, of course, upon a similar association process previously established in the child's mind in just such a way as these subsequent and more definite conceptions arise. The look and gesture have meaning only in virtue of a specific situation with which they have been typically associated in the child's experience. It is therefore ultimately only a question of the uniformity of association between the word or other expressive reaction and a concrete situation, which

at the outset must be conceived simply as the total set of circumstances presented at the moment.

The establishment of the word's proper association now depends upon securing its utterance in conjunction with the rise of attention to that particular aspect of the concrete situation which it is designed to connote. Consciousness is, of course, primitively indifferent in this regard. Mark Twain humorously recalls this fact to our minds in Eve's reply when Adam inquired why she called a certain beast an elephant: "Because it looked like an elephant!" Any name may go with any object; there is no natural adaptation between the two. Each specific connection must be experimentally determined.

7. It is evident that in this process both the content associated with the word may be unduly extended or restricted, and its specific character and relations distorted in innumerable ways, as when Taine's child applied the term *bébé* (first learned in connection with the Christ child) to all pictures instead of to all children. The child's mind wanders at first in a fluid medium of relations which is potentially indefinite. It cannot receive, along with the presentation of the word, a formal definition of its content in terms already known. Its concepts must be defined through a process of simple and direct experimentation with the terms of speech. The misuse of words commonly entails specific, practical penalties, which spur the child on to renewed attempts at expression in modified forms. Through a series of such corrections the limitations and essential content of a term come into view, and the child is then said to have mastered its meaning.

The adult is prone to lose sight of the complexity of the problem by which the child is faced in learning speech. His world is already so full of meaning, so widely systematized, that each new element is illuminated by the defining and directive forces which he brings to bear in its interpretation. Though every sentence he hears is a novel combination of elements, it may thus be rendered entirely intelligible. In the case of the young child all this synthesizing is yet to take place, and the whole system of correspondences must be established point by point in a world which at the outset is a practical and intellectual chaos.

Such a process is subject to many errors of direction. The influence of practical experience is negative. It punishes mistakes, but scarcely indicates their remedy. Progress depends upon the individual's own initiative, and rectification in the use of terms may come very slowly or not at all. Malaprop and Partington are classical literary examples of such arrested development. If terms occur only in one's reflective criticism of life, and not in the practical adjustment of its affairs, such misconceptions may persist into adult life even among the educated. I know one university graduate who used the word "tolerable" as an equivalent of *dreadful,* and another who spoke of an "information of the leg" when he meant an *inflammation.*

8. The child's task in defining and correcting verbal concepts is a laborious one, and in its earlier stages his mind is beclouded by a confusion of fantastic meanings which, with more or less plausibility, he has given to the terms of common speech. This appears most dramatically in his verbal substitutions. *Apostles' creed* appears as "pots of cream;" *palisades* becomes "parlor shades;" the *baccalaureate* is transformed into the "paregoric sermon;" the phrase, "children of *believing* parents" puzzles the child who thinks it restricts baptism to the offspring of the "leading parents."

Resemblance to other words leads to wholesale misconception. "Lava," wrote one child, "is what the barber puts on your face;" "the equator," said another, "is a menagerie lion running around the middle of the earth." Floating verbal associations are seized upon and unreflectingly appropriated. "Water," an English school child wrote, "is composed of two gases, oxygen and cambrigen." "He was making his flag offering before the glass with many flourishes," writes a correspondent; "I pledge agility to my flag and to the republican for which it stands!"

Words may not have any definite content for the child; they may only vaguely stir the mind or provoke a purely emotional reaction. Of a counting-out rhyme which ended:

"One flew east and one flew west;
"One flew over the curlew's nest,"

the writer of a delightful pedagogical essay says: "What flew east and what flew west she never had, I think, the slightest idea. But she felt no need of explicitness. It was enough to see in vision the darting of swift, shadowy wings across a great, beautiful sunset sky."

In his mistakes, as truly as in his orderly progress, the child is using speech to express his meaning in exactly the same way as the adult. Extensions and corrections, change and progress, conform to the same principle in the two cases. All communication must be in terms of the vocabulary possessed. Where few verbal concepts exist in the child's mind their denotation must be extended; where subtler distinctions are to be expressed than are yet embodied in substantives qualifying terms must be introduced; where speech fails him altogether he falls back upon gesture and pantomimic representation. It is through such incessant attempts to mold the plastic materials of speech to his own immediate practical needs that mastery actually comes, and one cannot well imagine its attainment in any other way.

9. Nevertheless, there is need of bringing the child to realize the exact content of the terms he uses by analysis as well as by application. The words themselves must be made objects of study if a fine sense of their values is to be cultivated. For the literary artist this study never ends, but in the common use of speech it scarcely enters except under some occasional stimulus. It is part of the teacher's work to arouse the child's interest in the forms of speech by converting such passing curiosity into an element of systematic method.

He may begin, for example, by calling for a preliminary definition of the word to be studied. This should be given by each member of the class, and should be written down both for the sake of future reference and also to secure an unaffected statement of the meaning which the term possesses for each individual child. These definitions should then be compared together to ascertain their general agreement and adequacy. Such an examination is likely to show that while none is satisfactory, the defects which individually appear are not common to all. Without further criticism of the written defintions than is necessary to show their disagreement, the

application of the term by one member of the class and another should next be called for, and when omissions in its common range of meanings occur, as they usually will, further possible applications should be suggested by the teacher. When a sufficient number of varying instances has thus been got together, set the class to inquire after the common significance which runs through them all. When found, give a name or precise statement to this common property as at least a provisional definition of the term.

With this touchstone in hand suggest plausible but not correct applications of the term and set the children to detect the error, calling for an exact explanation of the grounds for rejecting each such misapplication. It is important to bring out the reasons why these extensions are not legitimate, for the child does not understand a word's exact meaning unless he knows what to exclude as well as what to include.

It is often necessary to proceed slowly with this phase of instruction and to return frequently to the definition, for that must first of all be fixed in mind or the result will be merely intellectual confusion. A cloud of vaguely associated meanings will hover in the child's mind, and in its shadow he will grope in vain for any distinct conception to which he can hold fast.

A serviceable definition having been secured, the study of word and meaning may be extended by the description of groups closely related to the class in question, which the pupils are then called upon to name. The specific difference which sets off each such term from the word studied should then be called for, and the place of the latter in a system of related terms thus set forth.

After such exercises as these in the discrimination of meanings and terms the definition should be called for again orally; and as it is formulated from the successive statements which the children contribute, bring the class to see that the definition is but a statement summing up the common factors or essentials to membership in the class. Criticise each defintion as it is offered, pointing out in what way it is defective, and emphasize the need of keeping these successive corrections in mind as the class proceeds in its work of formal definition.

With this worked out, have each member of the class turn to the definition he had originally given, and criticise it with a view to bringing out the specific defect latent in each.

Finally, set the class to explore the ramifications of meanings connected with the term in question, listing accepted variations, discriminating shades of difference, enumerating synonyms, noting analogical transferences of meaning and defining related words in terms of their differences from that studied. Add also what may be useful concerning the history of the word, its root significance and the successive changes of meaning it has undergone, but be careful that these supplementary facts do not becloud the child's grasp of the word's present use, which must always remain the cardinal point for the instructor.

(To be concluded.)

COMMUNICATIONS AND DISCUSSIONS.

THE RELATION OF BREATHING TO ORAL READING.

Some of the recent investigations in reading, such as Dearborn's work in eye movements, have emphasized the physiological side of the subject. The view held by such investigators is that the reading activity is a highly specialized habit, and that any scientific study of the habit requires, first, a careful analysis of the habitual activity into its elements, and second, a very careful study of these elements.

If reading is viewed from this standpoint, one phase of it which stands out prominently is, as stated in the title, the relation between breathing and oral reading. More specifically our problem is concerned with the difficulties which children have in adjusting their breathing to oral reading and the effect of daily practice upon this adjustment. The relation of this problem to the growth and development of the child is also of much importance. The effect of the training given by teachers of music or elocution is also of interest to us.

The apparatus used in the present investigation was a kymograph, which carried the smoked paper on which the record was made, and a simple form of the pneumograph, which was placed upon the upper part of the chest and connected by means of a rubber tube to a Marey tambour, the needle of which traced the record on the smoked paper. A time line was procured by means of a Jacquet chronometer.

Fifty subjects were used in the experiment. These were university men and women, as well as children from the third to seventh grades, inclusive. The work stopped with the third grade on account of the difficulty in getting children of the primary grades to come to the laboratory, since the distance was so great. No records were taken above the seventh grade, because as the schools are organized here the eighth grade is a part of the high school. Further work in the study will take up the high school phase of the subject.

The reading matter was the same for all the men. In this case a page from Bagley's Educative Process was used. The material for the women was a page from a standard magazine, and was the same for all. For the children the material was selected from the Baldwin series of readers. This was different for each grade, but was the same for the boys and girls of a given grade.

In taking the records very few of the men and women knew any-

thing of the experiment except that it was a test in reading. The apparatus was found to be a disturbing element for many of the children, so that it was thought best to make some explanation of it to them. All subjects stood with the back to the apparatus, so that the amount of attention given to it was reduced to a minimum. Caution was given in all cases that the reading should be done in a natural manner.

Some Tentative Conclusions.

There is a decided sex difference. The girls' curves show much more regularity than those of the boys. This is true when each curve is examined by itself or when those for different individuals are compared. The men's curves are much more regular than those of the women. It can be said that the curves for the men and girls are much alike in their regularity, and that the curves for the boys and women are much alike in their irregularity.

There is a decided improvement for the boys from the third to the seventh grade, although the improvement is more noticeable from the third to the fifth than from the fifth to the seventh. The height of the curves increases gradually.

The curves for the girls are decidedly regular until the seventh grade, when there is a break which evidently foretells the great irregularities found in the curves of the women. The height of these curves increases very much at the fifth grade.

The length of the reading period (time between breaths) is not usually more than four or five seconds, and in many cases it is less. This time can be increased to nine or ten seconds, as is shown by the curves of those who have had considerable training in public speaking.

Some curves show that the subjects are abdominal breathers. This is the type of breathing insisted upon by teachers of elocution and vocal music, and children who have this co-ordination already established have thus a distinct advantage over those who have not.

Some Tentative Suggestions for the Teaching of Reading.

This work indicates a kind of co-ordination which children must acquire in their reading, and it certainly should be taken into account by teachers of the subject.

Girls are in many cases better readers than boys. This has usually been thought due to indifference on the part of the boys, but the sug-

gestion here given is that the boys do not have certain co-ordinations of the respiratory organs which are essential for good reading. This suggestion will apply equally well in the teaching of music.

The increase in the height of the curves for both the boys and girls indicates that the kind and amount of expression to be expected of children will vary from year to year.

The statement is made by certain critics of methods of teaching primary reading that the subject as now taught produces a great amount of stuttering among children. The irregularities in the breathing of the boys while reading indicate a tendency toward stuttering, which good teaching should take into consideration.

Future Work.

The work in the future will be done with two pneumographs. One will be placed on the upper chest and a second on the abdominal region, so that both types of movements may be considered. All the children tested last year will be tested again this year to see what effect a year's physical development and practice in reading has had upon their breathing. A correlation between tone of voice, accent, inflection, etc., and different types of breathing will be attempted.

Some curves have been made for silent reading. It appears that such reading has a decided effect upon the breathing curves, in that the large waves are made up of a continuous series of smaller waves. This phase of the work will receive careful attention.

High school pupils will be studied so that the two parts of the present study may be connected. It will also be possible to carry the investigation into the grades below the third.

It is realized that the manner of dress has a certain effect upon the breathing of both adolescent girls and women. An attempt will be made to determine the nature and the amount of this effect.

University of Texas. C. TRUMAN GRAY.

THREE PHASES OF THE FIFTEENTH INTERNATIONAL CONGRESS ON HYGIENE AND DEMOGRAPHY.

At the Fifteenth International Congress on Hygiene and Demography, held at Washington, September 23-30, three sections were of especial importance to the educational world. Even the most impatient reformer must have felt the keenest satisfaction in the representations there of eugenics, sex hygiene and mental hygiene. So

markedly important and so earnestly attended were these phases of the work of the Congress that we venture to predict that another year will not see them relegated to sub-sections on the programs and to odd corners in the lecture halls. The public exhibit which was held for three weeks in conjunction with the meetings of the Congress probably was the most effective educational exhibit ever held in this country. At this exhibit the American Federation for Sex Hygiene was allotted space that was no small percentage of the total floor space of the Red Cross building. The eugenics exhibit was managed in connection with that for sex hygiene, a happy combination and one that proved most valuable. The exhibit for eugenics consisted chiefly of charts and diagrams of the current theories of eugenics, accompanied by references to Galton, Darwin, Mendel, et al., and culminating in the charts showing the heredity of defects. The sex hygiene exhibit showed by slides, charts and models the dangers of sexual immorality, the need of instruction, and the methods of instruction. It was commonly remarked that whereas five years ago such an exhibition would have brought its originators into the courts, now it was attended by people of both sexes, influenced by an earnestness far removed from morbidity. The value of the exhibit was enhanced by the distribution of literature fairly representing the best thoughts on sex hygiene. One entire lecture-room was given over to lectures and talks on this subject. Other lectures, illustrated by moving pictures, showed the evolutionary processes in reproduction. These lectures were often supplemented by more important lectures in the large lecture hall of the building, which each time was taxed to its capacity by an interested (not curious) audience. At the official meetings of this subsection of the Congress the quarters were painfully inadequate, both for sex hygiene and for eugenics. All phases of the work of these sections were well reported by the newspapers of Washington.

The section on mental hygiene received its usual space in the Congress, and more than was supposed to be its fair share of space at the exhibit. We should feel our indebtedness in this respect to Dr. Schereschewsky, director of the exhibit, and to the gentlemen of the New York State exhibit. No small share of the success of the entire exhibit was due to Dr. Schereschewsky, who was particularly alive to the importance of and the advance in those sciences which are fundamentally social. Of noteworthy interest were the special

exhibits of the recent progress in the studies of feeble-mindedness, represented by material from the Training School at Vineland, and from the Minnesota School at Faribault. Dr. Goddard of the former and Dr. Rogers of the latter institution spoke effectively to interested audiences at the exhibit lectures. Dr. L. F. Barker, in his chairman's address, presented succinctly to the Congress the present status of the study of feeble-mindedness. At the subsection on eugenics addresses were made by such men as Grüber, Davenport, Saleeby and Bigelow. Venereal disease received considerable attention under the section for military hygiene. School hygiene was well represented in an extensive and varied program, including the subjects of sex hygiene, child hygiene, hygiene of the school proper, and medical inspection.

A feature of the exhibit, and a phase of mental hygiene that we think will take some place in future congresses of this sort, were the exhibits of mental tests as represented by the Cornell University School of Education Exhibit and that of the Child-Study Laboratory. The Cornell exhibit displayed the apparatus and methods of experimental educational psychology, particularly featuring the Binet tests. This exhibit was considered of sufficient importance to deserve an "award of merit" from the judges of the exhibit. Stoelting apparatus was on demonstrational display in charge of a representative from the Cornell education laboratory. Demonstrational Binet tests were conducted and explained to interested visitors, children for the tests being picked up at random about the exhibit. A demonstration lecture on Binet tests was given in the exhibit lecture hall. (Credit should be given to the New York State Committee for financing the Cornell exhibit.)

The Child Study Laboratory, an exhibit supported by private subscription, gave a demonstration of clinical study of children. Children were brought in by arrangement with the Washington schools and submitted to anthropometric, medical and psychological examination. Professor Bassett conducted many of the Binet tests, using the Huey modification.

Mention should be made of the various exhibits for school hygiene and for medical inspection. Dr. Dresslar of the United States Bureau of Education had an interesting exhibit of collapsible models of rural school buildings. These were complete miniatures in cardboard which could be sent through the mail to school boards con-

templating construction of new buildings. Dr. Dresslar also had on exhibition various types of window shades and a new idea in the shape of glass blackboards.

The exhibit played no small part in the importance of the Congress. It was as nearly ideal as so enormous and widely representative an exhibit can be, and we feel sure that its influence will be felt throughout the country. From Washington the various exhibits have been carried to their respective States, so that there is almost an epidemic of exhibits now operating throughout the country. New York State has planned a methodical exhibit campaign. These exhibits must have an important influence on the public at large, coming, as they do, at this time when so much popular interest is manifested in educational matters. The Washington exhibit was visited daily by thousands during the three weeks of its continuance, and included among its visitors practically all of the foreign and American delegates to the Congress, as well as thousands of visitors who came to Washington to attend the meeting of the Congress. The Congress itself was excellently attended, and the trend of the discussions was most gratifying in the progressiveness manifested and in the desire for unification in all the branches of science represented. Most of the foreign delegates purposed visiting American institutions, and the stimulating effect of their visits will be hard to estimate.

Vineland, N. J. E. A. DOLL.

MENTAL TESTS AT THE MENTAL HYGIENE CONFERENCE.

Of the many scientific conferences held in such numbers this year in the United States, the recent mental hygiene conference at the College of the City of New York, November 8-15, is of particular interest to readers of this JOURNAL. The conference was conducted by the National Committee for Mental Hygiene in co-operation with the Hygiene Committee of the New York State Charities Aid. The meetings of the Conference were adapted to special audiences, such as general-public meetings, nurses' meetings, physicians' meetings, college men's meetings, college women's meetings, and parents' meetings. The addresses were delivered by such speakers as Dr. L. F. Barker, Dr. T. W. Salmon, Dr. A. Meyer, Prof. R. S. Woodworth and Mr. Homer Folks. Papers were read on various subjects allied to insanity, such as mental disease, psychiatry, relation of immigra-

tion to insanity, alcohol and insanity, heredity and insanity, and other such topics. The meetings were well attended by the public and by professional men, and at one meeting there were present many delegates to the Clinical Surgeons' Conference, which was then in session in New York. It is estimated that at least 25,000 attended the exhibit and lectures.

In connection with the Conference there was held an educational exhibit, which was substantially a portion of the New York State exhibit recently shown at the Fifteenth International Congress on Hygiene and Demography. Of particular interest was the exhibit sent from the Department of Research of the Training School of Vineland, N. J. This was practically the same as the Cornell exhibit of educational psychology, also held at the Fifteenth International Congress. The feature of the exhibit was the Binet testing, and the intense popular interest displayed in the work was most encouraging. The exhibit and the testing were in charge of the assistant in psychological research at the Training School, who examined children brought in by interested parents. The purpose of the testing was to make clear to the public the nature and administration of the tests, and the importance of such public demonstrational work should not be underestimated. If the public can see such testing done by competent experimenters, well-versed in psychology and well-trained in the Binet tests themselves, it is to be expected that they will form independent opinions as to their value, and also that ignorance concerning the tests may be removed. In the face of the adverse criticism of insufficiently experienced writers whose mere names carry some weight, it is important that the public be informed under the best conditions.

Considerable effort was made to have accurate reports published in the newspapers, and this was attended with some success. The children examined ranged from defectiveness (including a Mongolian idiot and a number of feeble-minded) to one child four years above normal (a girl of eight). A few cases were discovered of children who had been coached in the tests. These were easily detected and properly placed by alternative tests or some slight disarrangement of the ordinary test.

E. A. DOLL.

Vineland, N. J.

ABSTRACTS AND REVIEWS.

SOME RECENT LITERATURE ON CRIMINOLOGY.

1. Gina Lombroso Ferrero. *Criminal Man According to the Classification of Cesare Lombroso.* New York: G. P. Putnam's Sons, 1911. Pp. xx, 322.
2. Hans Gross, J. U. D. *Criminal Psychology: A Manual for Judges, Practitioners and Students.* (Translated from the fourth German edition by Horace M. Kallen, Ph.D.) Boston: Little, Brown & Co., 1911. Pp. xx, 514. $5 net.
3. Charles Mercier. *Crime and Insanity.* New York: Henry Holt & Co., undated. (No. 17 of the Home University Library of Modern Knowledge.) Pp. 255.
4. C. Ainsworth Mitchell. *Science and the Criminal.* Boston: Little, Brown & Co., 1911. Pp. xiv, 237.
5. C. Bernaldo de Quirós. *Modern Theories of Criminality.* (Translated from the second Spanish edition by Alfonso de Salvio, Ph.D.) Boston: Little, Brown & Co., 1911. Pp. xxvii, 249. $4 net.
6. Raymond Saleilles. *The Individualization of Punishment.* (Translated from the second French edition by Rachel Szold Jastrow.) Boston: Little, Brown & Co., 1911. Pp. xliv, 322.
7. Frederick Howard Wines, LL.D. *Punishment and Reformation: A Study of the Penitentiary System.* (New, enlarged edition.) New York: Thomas Y. Crowell & Co., 1910. Pp. 387. $1.75 net.

The technical problems of criminology naturally lie somewhat outside of the province of a journal devoted to educational psychology; at the same time they do involve numerous problems of applied psychology, while the points of contact between them and the problems of the educator are by no means few when we bear in mind the questions that arise in connection with moral training and the possibilities and limitations of meeting and of overcoming criminal tendencies by educational institutions and measures of various kinds. For

these reasons we devote attention to a few of the many books on criminology that have appeared during the past few months.

Nos. 5, 2 and 6 of the above list are the first, second and fourth, respectively, of a series of nine translations of important foreign treatises upon criminology, now in process of publication under the auspices of the American Institute of Criminal Law and Criminology, and known as "The Modern Criminal Science Series."

In *Modern Theories of Criminality* (5) the reader will find a general survey of the field. In the first part Senor de Quirós gives an account of the origins and development of the science. These origins he finds in the occult sciences (precursors of criminal anthropology), in psychiatry and in statistics. He shows the parts played by the "three innovators," Lombroso, Ferri and Garofalo, and gives a readable, if somewhat sketchy, description of various theories, anthropological and sociological, of the nature and causes of crime. In the second part the rise and development of criminal law is treated, with special reference to indeterminate sentence, probation, the juvenile court, the reformatory, etc. In the third part scientific investigation of crime is explained, means of identification, the value of evidence and testimony, etc.

In Gross' *Criminal Psychology* (2) is found a book of very different caliber. It cannot be said, perhaps, that Gross has in every instance shown himself completely in touch with recent work in psychology, but his general range of knowledge is extraordinary, and his book is easily the most authoritative in its field. The general plan is to divide the subject into two parts—the first on the mental activities of the examiner, the second on the mental activities of the examinee. The problem of Part I is to set forth the difficulties, problems and precautions which concern the judge when taking testimony. There is an extended discussion of the outward expression of mental states, including some principles from Darwin's *Expression of the Emotions.*" Eighty pages are given to the problem of drawing inferences from the material presented, with interesting discussions of proof, mistaken inferences, causation, skepticism, probability and chance—all of them in a domain of applied psychology that stands much in need of presentation in lucid form for general readers. The problem of Part II is to set forth general and special conditions which affect the giving of testimony, with special reference to the testimony of old people, of women and of children,

to illusions and hallucinations, and to the effects of sleep, dreams, intoxication and suggestion. The book is supplied with two bibliographies and several "introductions."

The book by Saleilles (6) is a translation of a course of popular lectures delivered at Paris in 1898. As the author himself states that these lectures "on many points no longer represent the views of contemporary science," and are of use chiefly as an historical document, we may content ourselves by noting that the chief point brought out is that there are in the main two opposing points of view in the treatment of crime—the one, which he terms the "classical," regards punishment as determined by the objective crime, as a sort of retribution for the damage done; the other regards punishment as a corrective agency, which looks primarily toward the reformation of the offender, *i. e.*, punishment is individualized, adjusted to the nature of the criminal.

Chiefly of historical interest, also is the adaptation by his daughter, Gina Lombroso Ferrero, of Lombroso's *Criminal Man*. It should be understood that Lombroso was the pioneer of modern criminal science, and that his *L'Uomo Delinquente* has never before been rendered into English. Like most pioneers, Lombroso was overquick to generalize: few criminologists now accept even half of his conclusions. But his tremendous zeal and his painstaking inquiries inspired a large number of pupils and laid the foundations for a saner view of crime and the criminal. The translation is of a high order of merit, the volume is attractively gotten up, and the excellent summaries of the various works of Lombroso in the appendix will make the volume worth perusing by anyone who wants to understand the beginnings of the scientific study of crime.

Insanity is so often pleaded as a defense nowadays that the lay public may take some interest in Mercier's little volume (3), which aims to show what crime is, what insanity is, and how the two are related. The author shows how intoxication, feeble-mindedness, epilepsy, paranoia, general paresis and melancholia affect conduct, and presents an elaborate classification (10 pages) of various kinds of crime. When he comes, however, in his final chapter to discuss the nature of responsibility, the critical reader will not feel satisfied with the acqaintance with modern psychology there displayed. In fact, in criminology, as in psychotherapy, educational theory and other kindred fields, one cannot fail to note that many writers who

very plainly are not psychologically well informed undertake without any compunction tasks of psychological analysis and application from which the psychologist himself would shrink.

Mr. Mitchell's book (4) cannot fairly be appraised on this level of criticism, for it is constructed for popular sale and deals with the sort of things that catch the popular imagination and make up the bulk of detective stories—finger prints, handwriting experts, detecting inks, identifying human blood and hair, and includes histories of several notable forgery, murder and poisoning cases. The book is entertaining, though possibly not scientifically reliable.

The last book of our list, Wines' *Punishment and Reformation* (7), a new edition of a well-known book, has peculiar interest on account of the recent death of the author. Mr. Wines was one of the best informed and most respected writers on penology. The pith of the book is an exposition of the value of the "indeterminate sentence." Two new papers are added in this edition, one on "The Treatment of the Criminal" and one on "The New Criminology." We agree with a recent reviewer who characterized this volume as "the strongest contribution of American literature to the discussion of the fundamental ideas of the reformatory system." G. M. W.

WILHELM OSTWALD. *Monistische Sonntagspredigten. Erste Reihe.* Leipzig: Akademische Verlagsgesellschaft m. b. H., 1911. Pp. 208.

Monism as a scientific *Weltanschauung* has had for years its most brilliant expositor in Haeckel, who, when he had reduced the cosmos to a unity of substance, found yet a problem in the nature of substance. Now the great chemist, Ostwald, shaping the world to the principle of the conservation of energy, and using his prestige as a scientist to decide *ex cathedra* the problems in every field of life and living by one measure—"the energetic imperative," itself largely a catchword—chills us with the absolute finality of his dictum and justifies that criticism of monism that already in 1892 Haeckel attempted to defend—namely, that monism does not satisfy the spiritual needs of mankind. A philosophy of life based on a knowledge of nature's laws is in itself not an inconsistency. But a certain arrogance of knowledge, presumptuous hypotheses, forced conclusions, science put into the seat of Yahweh, leave us cold. An unqualified scorn of humanistic culture, called "paper knowledge," as compared

with the real knowledge that science gives, and an inexorable hatred of the church, which seems to confound all religion with the strictest orthodoxy of bygone centuries, show in an excessive and crude form the modern reaction against the overdone classical education and the externalism of religion that have been prevalent in Germany. The "energetic imperative," while immensely valuable as a guide post, hardly allows the mantle of Kant to fall upon the shoulders of Ostwald. Nature loses no energy; perfect machinery transmits energy with a minimum of waste; do thou act also without waste of energy, are the ethics that guide a scientific *modus vivendi*. Though this gospel of efficiency offers valuable suggestions, only a shortsighted psychology can expect it to serve as a religion, and we must acknowledge that these "Sunday sermons" are, at times, quite as dry as the unscientific kind. Inconsistencies abound. Man, though scientifically on a par with other products of nature, alone practices justice and kindness in a natural world of cruelty and egotism, we are told, and we are bidden to put our efforts at the service of our fellowmen and to love mankind more than self. While this is admirable, for a conclusion reached through modern science it sounds strangely old. A respect for technology as putting the acquisitions of science at the disposal of the masses, a scorn for all reverence for the old, as such, combined with a looking into the future instead, and a forced optimism are other significant features of the sermons. The titles cover a wide range of subjects: truth, the origin of evil, immortality, evolution, Tolstoi, the philosopher's stone are a few out of twenty-six. Among the more interesting ones are those devoted to the theory of energy and its application to living and the one on Nietzsche.

ELFRIEDA HOCHBAUM POPE.

Ithaca, N. Y.

THE
JOURNAL OF EDUCATIONAL PSYCHOLOGY
INCLUDING EXPERIMENTAL PEDAGOGY, CHILD PHYSIOLOGY AND HYGIENE, AND EDUCATIONAL STATISTICS

Edited by
W. C. BAGLEY, C. E. SEASHORE,
J. CARLETON BELL, Managing Editor. GUY MONTROSE WHIPPLE.
Published monthly except July and August by
WARWICK & YORK, INC.,
BALTIMORE, MD.

Manuscripts for publication, books or other material for review, and news items of interest to educational psychologists should be addressed to The Managing Editor, J. Carleton Bell, University of Texas, Austin, Texas. Research contributions from England may be sent to W. H. Winch, Esq., Melville Villa, Overhill Road, Dulwich, London.

The Journal is issuing a series of Monograph Supplements for the publication of more extensive researches in educational psychology. For details prospective contributors may apply to Guy Montrose Whipple, Cornell University, Ithaca, N. Y.

The price of the Journal in the United States and Mexico is $1.50 a year. Foreign subscriptions: Canada, $1.70; 7s. 5d. in England; M7.60 in Germany; 9.30f. in France and the equivalent in other foreign countries.

Subscriptions and correspondence concerning business matters should be sent to Warwick & York, Inc., 19 W. Saratoga St., Baltimore, Md.

VOLUME IV JANUARY, 1913. NUMBER 1

EDITORIALS.

In the *Journal of Education* (Boston), issue of October 31, we find the following quotation attributed to Judge Ben B. Lindsey:

JUDGE LINDSEY ON PUBLIC PLAYGROUNDS.

"In dealing with the problem of crime in youth, we shall make progress just in proportion as we appreciate the absurdity of limiting our remedies to the court, the jailer and the hangman. Our plea for public playgrounds is a plea for justice to the boy. We are literally crowding him off the earth. We have no right to deny him his heritage, but that is just what we are doing in nearly every large city in this country, and he is hitting back, and hitting hard, when he does not mean to, while we vaguely understand and stupidly punish him for crime. *Why shouldn't he rebel?* The amazing thing is that he is not worse than he is." (The italics are ours.)

We have the highest admiration for Judge Lindsey and for the great work that he is doing. We have an unshakable faith in his sincerity, and a deep sympathy with the fine altrusim expressed in the above paragraph. He would be the last to encourage boys to break laws that do not happen to suit them. And yet the above quotation, taken just as it stands, implies, along with its altruism, a certain doctrine or attitude that seems to us to be fraught with danger—a doctrine or attitude that has already worked mischief in school government, whatever may have been its influence in civil government.

Why shouldn't the boy rebel? The situation oppresses him. So the industrial situation oppresses a good many people. Shall we encourage them for that reason to play fast and loose with the law of property? The marriage contract oppresses some people. Shall we indorse the doctrine of affinities. Our system of import duties is far from equitable. Shall we palliate smuggling?

The greatest problem of American education today is to correct the most serious defect in our national life—and this defect is disrespect for law. Can we make the next generation law-abiding by encouraging our boys to break laws that do not please them—even when their *dissatisfaction* is thoroughly justified—even when the laws *are* unjust and inequitable? Is not this the attitude that today constitutes the most serious menace to the future of our democracy?

By all means let us recognize inadequacies and inequalities and bend every effort to correct them; but let us do it in the way that an intelligent self-governing people ought to be the first to indorse and the last to abandon. Evils exist, but no existing evil justifies anarchy. Democracy has made many mistakes; but there is only one mistake that will be fatal, and that is to confuse liberty with license—to reason from an equal voice in the making of laws to the "right" to break laws when they fail to please one—even when they oppress one.

And apropos of this matter of public playgrounds, there is one point that needs a greater emphasis than it has yet received. It is not the provision of opportunities for play alone that will solve the problem. Public playgrounds that are unsupervised have been proved to be as bad as, or worse than, no playgrounds at all. This is a clear conclusion from the experience of the first few years, when the movement was advocated simply upon the basis that the above quotation seems to imply—namely, that it is the lack of *room* and *opportunity* for expressing childish energy that has led to the serious situation regarding juvenile delinquency. The playground experience up to date seems to have proved that it is not the playground as such, but the *supervision* and the *discipline* of the playground that exert the significant influence upon self-control and an adequate regard for the rights of others. Play offers unrivaled opportunities for impressing the essential lessons of law and order;

THE EFFICIENCY OF THE PLAYGROUND DEPENDENT UPON ITS DISCIPLINE.

but *play itself and as such is neither moral nor immoral.* Left to its own devices it may easily work evil, as the experience with the unsupervised playgrounds has abundantly proved. With careful supervision its powerful influence may be directed into wholesome channels.

SOME NEGLECTED RIGHTS OF CHILDREN.

What elements of the child's heritage are most seriously imperiled by the conditions of our modern life? Of what paramount "rights" are we depriving the individual members of the coming generation? If the records of juvenile delinquency tell the truth, it would seem that, with the growth of the urban population, there has gone a parallel relaxation of home discipline—and perhaps also of school discipline. The adequate control and direction of childish activities has been neglected. This tendency has been accentuated by plausible but fallacious doctrines of child government. All of these agencies combine to deprive the child of the heritage which is represented by the ideals of obedience, respect for the rights and feelings of others, self-control, and duty.

These ideals have come out of the history of the race through a long and tortuous process; they represent the important resultants of the conflict between the individual and society. In this struggle the rights of the individual in the social order have gradually been recognized; but this recognition does not mean for a moment that these ideals have lost their significance or that their necessity has been outlived. It is only their reference that has been changed. In place of responsibility to a monarch—to a concrete personality—there has developed the responsibility to the people as a whole. In place of obedience to the dictates of arbitrary authority we have substituted obedience to the collective will of society. But this is far from saying that obedience and responsibility have been devitalized. If this is the meaning of democracy, the end of democracy is clearly in sight.

We should conclude, then, that the most important "right" of childhood is the right to correction, to training, to discipline—to the type of education which will impress upon him from earliest childhood the fundamental lessons of the *licit* and the *non-licit.* And we should conclude also that among other forces, *supervised* play will prove a powerful aid in the realization of this purpose. But let us be certain that we place the emphasis where it clearly belongs.

W. C. B.

NOTES AND NEWS.

A short history of the development of high school education in Virginia has been prepared by Prof. Charles G. Maphis, professor of secondary education at the University of Virginia. The amount expended on high school buildings in the State has increased from $45,000 in 1905, to approximately $1,000,000 in 1912, and the enrollment is now eight times as large as it was seven years ago.

A new public Evening School of Industrial Art has been opened in New York City for the purpose of training its pupils under the actual conditions of the trades in which fine craftsmanship is required. Only those will be admitted to this school who are now actually engaged by manufacturers in the work of drawing, color and design in carpet and textile weaving, the working of metals and jewelry, carving, staining glass and other decoration.

The State of Minnesota has engaged Dr. Ernest B. Hoag, a health expert, to travel about the State and demonstrate to the citizens that rational conservation of the mental and physical health of children is possible and practicable with the means already at hand. Three plans are proposed: (1) Organization with a medical officer and a nurse, or nurses; (2) organization with a school nurse or nurses only; (3) organization by the employment of a simple non-medical health survey on the part of the teacher only. To make it possible for every community, however small, to possess the necessary technical knowledge, the State Board of Health will maintain at the state capital a "clearing-house of information concerning child hygiene, medical supervision, the teaching of school hygiene, and the like."—*Science.*

The college and university teachers of education of the State of Pennsylvania have organized an association, which held its first meeting at Harrisburg December 27, 1912. The program was as follows: "The Present Status of Educational Research," Prof. A. Duncan Yocum, University of Pennsylvania; "The History of Education in the Training of Secondary Teachers," Prof. Henry D. Shel-

don, University of Pittsburgh; "Courses in Education in Colleges for Women," President Anna J. McKeag, Wilson College; "The Function of the College or University Department of Education in Relation to the State Public School System," Prof. Bird T. Baldwin, Swarthmore College; "A Comparative Study of Teachers' Pension Systems," Prof. Raymond W. Sies, University of Pittsburgh.

The college professors of education of the Middle West met in conference at the University of Nebraska, December 19-21, 1912. The general topic for one of the sessions was "The Articulation of Courses in Theory with the Practice of Teaching," and the discussion included the following: "General Discusion of the Topic," Prof. W. A. Jessup, University of Iowa; "The Vitality of Teaching," Prof. W. F. Jones, University of South Dakota; "History and Present Status of Practice Teaching," Prof. B. E. McProud, Nebraska Wesleyan University; "School Observation: What It Should Seek to Accomplish; How to Administer It," Prof. Frank E. Thompson, University of Colorado; "The Aim of Practice Teaching," Prof. Charles Fordyce, University of Nebraska; "Practice Teaching: Its Administration in the University," Dean W. W. Charters, University of Missouri; "Practice Teaching: Its Administration in the Small College," Prof. H. H. Foster, Ottawa University; "The Relation of Courses in Methods to Practice Teaching," Prof. C. H. Johnston, University of Kansas.

Prof. Charles Hughes Johnston's book on "High School Education" is being translated into Japanese by Fumiwo Ando of the Tsuchiura Middle School, Ibarakiken, Japan. Professor Johnston has in preparation a further volume on "Social Aspects of Education."

Prof. Edward L. Thorndike of Teachers College, Columbia University, will give the psychology lectures on the Ichabod Spencer Lecture Foundation at Union College in February and March of this year. The general subject of the lectures will be "The Springs of Conduct," and the special topics will include "Human Instincts: A General View," "The Social Instincts," "The Original Roots of Wants, Interests and Motives," and "The Value and Use of Human Instincts."

CURRENT PERIODICALS.

(In this section only such articles will be noticed as bear directly or indirectly upon the interests of this Journal.)

AMERICAN JOURNAL OF PSYCHOLOGY. Vol. XXIII, No. 4, October, 1912. E. B. TITCHENER. *The Schema of Introspection.* 485-508. This masterly analysis of the methods of introspection is to be heartily commended to the attention of educational psychologists. The emphasis on objective tests in education should not obscure the fact that all knowledge of mental conditions goes back ultimately to introspection.

CHRISTIAN A. RUCKMICH. *The History and Status of Psychology in the United States.* 517-531. Psychology, as a pure science, shows a noteworthy growth in the past 25 years, yet lags considerably behind other recently established sciences, such as political economy, education, etc.

ARCHIVES DE PSYCHOLOGIE. Vol. XII, No. 46 (May, 1912). O. DECROLY AND J. DEGAND. *Observations on the Development of Ideas of Continuous and Discontinuous Quantity in the Child.* 81-121. A detailed, analytical study of the development of ideas of number, size, length, etc.

EDM. CRAMAUSSEL. *The Sleep of a Small Child.* 139-189. An extended experimental study of the depth of sleep of a child from six months to one year old, with an evaluation of the results from a psychological point of view.

No. 47 (September, 1912). M. ROD. WEBER. *Is the Reading Faculty Localized?* 305-309. The author accepts the existence of a "reading center or area," but believes that such a center is built up by training, and is not the result of inheritance. He supports his view by citing the behaviour of a patient who was so nearly blind from birth that he had been taught to read not by sight, but by touch. This patient could distinguish large letters, but he could not read the words which they constituted, because he had never had this particular neural association developed by training.

EDUCATIONAL REVIEW. Vol. XLIV, No. 5, December, 1912. J. W. RAYMER. *Advisory Systems in High Schools.* 466-491. Presents the results of a questionnaire investigation to determine how much advice is actually given pupils in selecting their high-school courses, and the manner in which this advice is offered.

THE ELEMENTARY SCHOOL TEACHER. Vol. XII, No. 2, October, 1912. LUELLA A. PALMER. *Montessori and Froebelian Materials and Methods.* 66-79. An evaluation of the Montessori methods by a Froebelian. The author suggests "the feasibility of com-

bining the different materials and methods into one system for the education of little children."

ARTHUR S. OTIS AND PERCY E. DAVIDSON. *The Reliability of Standard Scores in Adding Ability.* 91-105. An important study of Test No. 1 of the Courtis standard scores in arithmetic to determine the value of such scores for the measurement and understanding of the work of individuals. The test was tried on 202 eighth-grade children of the San Jose schools 25 times. Slight modifications were made in some of the trials. The authors conclude that a single trial with such a test affords but a very precarious measure of the ability of an individual.

No. 3, November, 1912. CHARLES H. JUDD. *Initiative, or the Discovery of Problems.* 146-153. Merely to confront a child with a situation involving a real need is not sufficient to rouse him to activity. "The realization of problems is itself a matter of training. A child must learn to see the problems of life." * * * "Most untrained people evade problems rather than develop through their contact with problems."

REVUE PSYCHOLOGIQUE. Vol. V, No. 1, March, 1912. LADISLAS NAGY. *Instruction in Paidology for Educators, Physicians and Officials of Children's Courts.* 3-12. The author rejects psychology as the basic science for education, and urges greater emphasis on the scientific study of the child. He shows the general ignorance of paidology and the need for instruction in the science, and discusses six types of such instruction.

A. SLUYS. *Instruction in Paidology in Normal Schools and Universities.* 12-22. A history of the attitude of Belgian normal schools and universities toward scientific paidology, and recommendations looking toward the introduction of experimental work on the subject.

I. IOTEYKO. *Instruction in Paidology for Teachers and Physicians.* 23-36. An outline of a course in paidology, embracing hygiene, anthropometric measurements, physiology, psychology and pedagogic tests.

GABRIELLE FRANCIA. *Organization of a Paidological Laboratory as an Annex to Every Normal School.* 37-43. Such a laboratory should have at least four rooms—an apparatus-room, an examination-room, a record-room, and a private workroom.

I. IOTEYKO. *The Unification of Terms, Measurements, and Notations in Paidology.* 44-76. A discussion of various aspects of psychological and paidological terminology, and an attempt to establish the limits of the new science.

V. KIPIANI. *The Tropisms of Pupils.* 77-92. An ingenious attempt to carry over the concept of tropisms, as developed by Loeb and applied to the reactions of lower organisms, to the behavior of school children, with especial reference to their reactions to light.

PUBLICATIONS RECEIVED TO DECEMBER 1, 1912.

(Notice in this section does not preclude a more extended review.)

TSURU ARAI. *Mental Fatigue.* Teachers College, Columbia University: Contributions to Education, No. 54, 1912. Pp. 115. $1.

This is probably the most intensive study of mental fatigue that has ever been made. After a splendid historical survey of the subject, the author recounts the results of experiments to determine the change in mental efficiency produced by various types of mental work. Among these was a careful study of the effects produced by the mental multiplication of four place by four place numbers continued for 12 hours without interruption. There was a gradual increase in the average time required for each multiplication, until at the close of the 12 hours the average time was almost double that at the beginning. The feeling of fatigue was only slightly correlated with the decrease in mental efficiency.

GEORGE SIDNEY BRETT. *A History of Psychology, Ancient and Patristic.* London: George Allen & Co., Ltd., 1912. Pp. 388.

A most comprehensive and helpful treatment of the subject.

L. CELLÉRIER AND L. DUGAS. *L'Année Pédagogique.* Première Année, 1911. Paris: Felix Alcan, 1912. Pp. 487.

This publication forms a novel and valuable addition to the list of educational periodicals. Appearing only once a year, its aim is to give a comprehensive survey of the contributions to education that have appeared during the previous year. In the initial volume there are five articles of a general nature, summing up the trend of educational thought in each of the fields considered. These are followed by a pedagogical bibliography for the year 1911, containing 2502 numbers arranged under their appropriate headings, and most of the citations are accompanied by helpful explanatory or critical comment. This feature of the work makes it an invaluable source of reference for the student of education, and performs for education the service which has long been rendered to psychology by the *Psychological Index.*

HERBERT W. CONN. *Biology: An Introductory Study.* New York: Silver, Burdett & Co., 1912. Pp. 425. $1.50.

At once simple and comprehensive. Replete with illustrations, easy and fascinating in style, it furnishes the background which

every teacher and superintendent needs at the present time in order to follow intelligently current educational discussions and to appreciate the physical and mental make-up of pupils.

MAX DESSOIR. *Outlines of the History of Psychology.* New York: The Macmillan Company, 1912. Pp. 278.

A handbook admirably adapted as a textbook for class use, and which should stimulate the development of courses in the history of psychology.

WILLIAM P. HASTINGS. *Education: The Old and the New.* Battle Creek, Mich.: Published by the author, 1912. Pp. 299. $1.

This book presents the personal reaction of a veteran teacher to a wide range of educational problems from genetic psychology to industrial training. It makes no claim to scientific treatment, nor is it of scientific value, but it lays much emphasis on health and calls for a sane and rational attitude toward the work of the schools.

M. A. LEIPER. *Teaching Language Through Agriculture and Domestic Science.* Washington: Bureau of Education, 1912. Bulletin No. 490. Pp. 30.

What shall be taught in rural schools? The present monograph is an attempt to center the language and literature work of rural schools in the activities and products of farm life. There has been so little of this done heretofore that an overemphasis of the immediate environment of the child will do no harm, but there is no doubt that such overemphasis is possible. We must not forget that the farmer's life is narrowing at best, and that the only opportunity for a glimpse of the broader world for many farmers' children is through literature.

WILLIAM H. MAXWELL. *A Quarter Century of Public School Development.* New York: American Book Co., 1912. Pp. 429. $1.25.

This interesting volume is a compilation from the reports and addresses of Superintendent Maxwell, and is issued as a kind of "Festschrift" on the twenty-fifth anniversary of his service as superintendent in Brooklyn and New York. The thirty-four chapters present Dr. Maxwell's views on almost every important problem that has engaged the attention of educators during the past quarter century, and show him courageously and consistently standing for the best interests of the pupils. There is a cordial introduction by President Butler of Columbia.

PAUL NITSCHE AND KARL WILMANNS. *The History of the Prison Psychoses.* New York: Journal of Nervous and Mental Diseases, 1912. Pp. 84, xiv. Translated by Francis M. Barnes and Bernard Glueck.

A historical psychological treatment with bearing on prison reform.

BENJAMIN R. SIMPSON. *Correlations of Mental Abilities.* New York: Teachers College, Columbia University: Contributions to Education, No. 53, 1912. Pp. 122. $1.

"This monograph is a contribution to knowledge of individual differences, especially in that complex of qualities which we call 'general intelligence,' and of the means of measuring them. Its special purpose is to determine the *significance* of certain tests by showing what relations they have to one another and to general intelligence in its common meaning."

WILLIAM H. TOLMAN AND ADELAIDE WOOD GUTHRIE. *Hygiene for the Worker.* New York: American Book Co., 1912. Pp. 239. 50 cents.

Teachers, students and workers generally are fortunate in having offered to them this excellent little text on healthful living. Dr. Tolman, the director, and Miss Guthrie, department of research of the American Museum of Safety, have an international reputation in industrial hygiene, and the book has been prepared under the editorship of Dr. C. Ward Crampton, Director of Physical Training, New York City. The style is direct, the treatment is thorough, and the chapters are copiously illustrated.

FREDERIC LYMAN WELLS. *The Question of Association Types.* Reprinted from the Psychological Review, July, 1912. Pp. 253-270.

A study of the material secured in testing the Kent-Rosanoff free association experiment reveals five fairly definite types of association. They are (1) the predicate; (2) the supraordinate; (3) the contrast; (4) the miscellaneous or internal-objective, and (5) the speech-habit groups.

WILLIAM A. WHITE. *Outlines of Psychiatry.* New York: The Journal of Nervous and Mental Disease Publishing Co., 1913. Pp. 318.

A revised edition. One chapter is devoted to the Binet and Simon tests.